

Nutritional Knowledge, Attitude and Practice among Patients with Type 2 Diabetes in North Central Health Authority in Trinidad and Tobago

MC Webb, JJ Aguilal

ABSTRACT

Objectives: To assess knowledge, attitude and practice in relation to their disease among patients with Type 2 diabetes mellitus in one regional health district in Trinidad and Tobago and to compare these attributes between patients receiving/not receiving nutrition counselling.

Methods: A cohort of 122 patients with diabetes was selected on site at their respective public clinics via quota sampling and surveyed using a structured questionnaire.

Results: Mean knowledge score was 5.4 (SD = 0.985). Mean attitude and practice scores were significant between those who received and did not receive counselling ($p = 0.033$ and < 0.001 , respectively). Patients receiving nutrition counselling were more likely than those not receiving counselling to not drink soft drinks ($p < 0.001$), consume fast foods ($p < 0.001$) and drink alcohol ($p = 0.003$) but were equally likely to drink at least eight glasses of water daily. Additionally, patients receiving and those not receiving counselling were equally likely to agree with the attitude statements given. There was a statistically significant interaction between the effects of gender and age group on knowledge score, $F = 2.631$, $p = 0.039$. Nutrition counselling was a statistically significant predictor of knowledge score ($B = 0.444$, standard error = 0.192, $p = 0.023$).

Conclusions: Patients receiving nutrition counselling were more knowledgeable about diabetes than those not receiving such counselling, and had a more positive outlook as to what it would take on the part of the patient and clinicians to manage the disease effectively.

Keywords: Attitude, diabetes, knowledge, practice

Conocimientos, Actitudes y Prácticas Nutricionales entre los Pacientes con Diabetes Tipo 2 en la Autoridad Sanitaria Central Norte en Trinidad y Tobago

MC Webb, JJ Aguilal

RESUMEN

Objetivos: Evaluar los conocimientos, actitudes y prácticas entre los pacientes con diabetes mellitus tipo 2 en relación con su enfermedad, en un distrito regional de salud en Trinidad y Tobago, y comparar estos atributos entre pacientes que reciben o no reciben asesoramiento nutricional.

Métodos: Una cohorte de 122 pacientes con diabetes fue seleccionada en el lugar en sus respectivas clínicas públicas mediante muestreo por cuota, y encuestada utilizando un cuestionario estructurado.

Resultados: La puntuación promedio con respecto a los conocimientos fue 5.4 (SD = 0.985). Las puntuaciones promedios de la actitud y la práctica fueron significativas entre los que recibieron y no recibieron asesoramiento ($p = 0.033$ y < 0.001 , respectivamente). Los pacientes que recibieron asesoramiento nutricional presentaron una mayor propensión a no beber refrescos ($p < 0.001$), consumir alimentos de preparación rápida ($p < 0.001$), o beber alcohol ($p = 0.003$), en comparación con aquellos que no recibieron asesoramiento, pero fueron igualmente propensos a beber al menos ocho vasos de agua todos los días ($p = 0.383$). Además, tanto los pacientes que recibieron, como los que no recibieron asesoramiento presentaron igual probabilidad de concordar con los enunciados en torno a la actitud. Hubo una interacción estadísticamente significativa entre los efectos de género y grupo etario en cuanto a la puntuación de conocimientos, $F = 2.631$, $p = 0.039$. El asesoramiento nutricional fue un predictor estadísticamente

significativo de la puntuación de conocimientos ($B = 0.444$, error estándar = 0.192, $p = 0.023$).

Conclusiones: *Los pacientes que recibieron asesoramiento nutricional demostraron conocer más sobre la diabetes que los que no recibieron tal asesoramiento, y poseían una actitud más positiva en cuanto a lo que sería necesario por parte del paciente y los médicos para manejar eficazmente la enfermedad.*

Palabras claves: Diabetes, conocimiento, actitud, práctica

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INTRODUCTION

Trinidad and Tobago, a developed, twin-island country and the southernmost territory of the West Indies, is experiencing an epidemiological transition characterized by a decline in communicable diseases and an increase in chronic non-communicable diseases [CNCDS] (1). The global pandemic of CNCDS continues to grow at an alarming rate, resulting in a crucial public health challenge in the 21st century. Chronic non-communicable diseases are harming the health of the global population, causing much preventable loss of life, decrease in productivity and decline in quality of life. Chief among the leading CNCDS is Type 2 diabetes mellitus. Global statistics show that 8.3% or 382 million people were living with diabetes in 2013 and this number is expected to increase to 592 million by 2035 (2). The prevalence of Type 2 diabetes among adults in the Caribbean is high and consistently above the global average (2). Although Trinidad and Tobago dropped out of the top 10 countries in the world with Type 2 diabetes prevalence for 2013, the estimated prevalence of 13.9% is still a cause for concern (2). In 2010, there were more than 315 non-traumatic lower-limb amputations in Trinidad and Tobago from complications of diabetes (3). Additionally, diabetes ranked second in the top 10 principal causes of death with rates per thousand population in Trinidad and Tobago (3). The costs of diabetes to the society are high and increasing on a daily basis. Under the International Diabetes Federation (IDF) regional classifications, more funds were spent on healthcare for diabetes in North America and the Caribbean than in any of the other regions for the reporting period 2013 (2). In Trinidad and Tobago, the cost of treating diabetes is high, both in terms of human cost and economic costs with the mean healthcare expenditures per person with diabetes at USD 1121 (2). With this large economic burden to the government, medical management alone cannot fight diabetes. Therefore, strategies and interventions such as medical nutrition therapy can play a role in reducing the incidences and financial burden of the management of diabetes.

Diabetes management requires patient's knowledge and understanding of what to do and when and how to do it. Studies have shown that patients who are knowledgeable about diabetes self-care usually have better long-term glycaemic control, thus reducing the rate of complications (4–6). Daly *et al* (7) reported that because of the belief that Type 2 diabetes is a very serious disease, individuals with worse control may have more difficulty in disease management. A study conducted on

attitudes and behaviours of patients with Type 2 diabetes found that physicians are aware that patient self-care behaviours influence diabetes control, but that patients with diabetes may have inadequate training and lack of interest to improve their behaviours (7). Contributing to poor control are the barriers to appropriate care behaviours or the relationship of specific self-care behaviours to glycaemic control (8). Patients have a major role in the control and treatment of Type 2 diabetes, therefore, it is imperative that they are provided with self-management education and diet therapy (9).

Nutrition education, which includes counselling, is an integral component of diabetes care. However, there remain uncertainties regarding the effectiveness of the nutrition counselling/education programmes implemented in Trinidad and Tobago. In order to plan a successful intervention, obtaining information pertaining to knowledge, attitudes and practices of the patients is of utmost importance in formulating the intervention. Studies have shown that education and awareness programmes can improve the knowledge of patients, thereby changing their attitude (10–12). In this context, the current study examined nutritional knowledge, attitude and practice (KAP) of patients attending chronic disease outpatient clinics in Trinidad and Tobago and compared these attributes between patients receiving and not receiving nutrition counselling.

SUBJECTS AND METHODS

The target population was all patients treated for Type 2 diabetes in chronic disease clinics within North Central Regional Health Authority (NCRHA). A sample of 188 was determined to be sufficient for estimating the percentage of patients who received nutrition counselling with a margin of error equal to 5%. All patients who visited the chronic disease outpatient clinics during the study period were approached to find out if they had diabetes and invited to participate in the study after getting their verbal consent. A cohort of 122 patients with diabetes was selected on site at their respective public clinics *via* quota sampling and surveyed using a structured KAP questionnaire related to their disease. Selected demographic-related variables were also measured. Men and women with Type 2 diabetes, with or without other chronic diseases, were eligible for inclusion in the study. Children, pregnant women and specially-abled patients with diabetes were excluded from the study. Ethical approval was obtained from the Southwest Regional Health Authority Ethics Committee. Permission to conduct the research was acquired from the Chief Executive Officer of Medical Research at NCRHA and Head Nurse in

charge of the area. Additionally, informed written consent was obtained from all patients.

The patients with diabetes were provided with nutrition counselling by a Registered Dietitian. These dietary counselling sessions included individual diet planning incorporating choices from the Caribbean six food groups. In addition to the individualized counselling, patients were divided into groups and each group had a clinic session every 12 weeks. The clinic sessions focussed on pursuing healthy lifestyles through the process of client empowerment and health education.

Data were collected from September to November 2012 using quota sampling. The data collection instrument was a 27-item KAP questionnaire. Variables measured included demographics, nutritional knowledge, attitude and practice with respect to diabetes. Sociodemographic information was also collected through the questionnaire. For the assessment of nutritional knowledge, we used eight items which focussed on portion control and foods which patients with diabetes should avoid. Correct responses for the knowledge questions were given a score of "1" and incorrect responses were given a score of "0". For the assessment of attitude, responses were given on a 5-point Likert scale ranging from "strongly agree" to "strongly disagree". For the practice statements, participants responded using a 5-point ordinal scale with options ranging from "never" to "very frequently". For the evaluation of attitude and practice, a score ranging from 1 to 5 was assigned to each response; "1" was given to the most positive response and "5" was given to the most negative. Clients who indicated that

they received counselling one or more times were given a score of "1" and those who did not receive counselling were given a score of "0".

Statistical Package for the Social Sciences (SPSS version 21.0, SPSS Inc., Chicago, IL, USA) and Minitab (version 16, Minitab Inc.) were used for data entry and analysis. To facilitate meaningful data description and data analysis, respondents were classified according to whether or not they had been receiving nutritional counselling. Quantitative analysis of the data included two-sample *t*-test, analysis of variance (ANOVA), tests of equality of proportions, general linear model and regression analysis. All hypotheses were tested at the 5% level of significance. Data analysis included frequency tables and graphs (descriptive), and comparison of patients receiving counselling and patients not receiving counselling with respect to knowledge score, attitudes and practice score. Chi-square was used to determine the associations between knowledge questions. Comparison of two proportions was used to determine the association between attitude and practice responses and patients who received counselling and those who did not. General linear model (two-way ANOVA) was used to compare the total KAP scores between the two groups. Regression analysis was used to evaluate what variables would be suitable predictors of knowledge score.

RESULTS

Of the 188 patients selected, responses were received for 122, giving a response rate of 65%. The mean age of the patients was 59.28 ± 11.69 . Table 1 presents the summary characteris-

Table 1: Frequency distribution of demographic variables: n (%)

Variable	All patients n = 122 (%)	Patients receiving nutrition counselling n = 86 (%)	Patients receiving no counselling n = 36 (%)	<i>p</i>
Gender				
Male	46 (37.7)	32 (37.2)	14 (38.9)	0.862
Female	76 (62.3)	54 (62.8)	22 (61.1)	0.862
Age (years)				
30–50	29 (23.8)	21 (24.4)	8 (22.3)	0.792
51–70	77 (63.1)	52 (60.4)	25 (69.4)	0.335
71–80+	16 (13.1)	13 (15.2)	3 (8.3)	0.390
Ethnicity				
African	18 (14.7)	14 (16.3)	4 (11.1)	0.582
East Indian	54 (44.3)	39 (45.3)	15 (41.7)	0.842
Mixed	50 (41.0)	33 (38.4)	17 (47.2)	0.422
Source of income				
Public assistance	19 (15.6)	14 (16.3)	5 (13.9)	1.00
Pension	48 (39.3)	35 (40.7)	13 (36.1)	0.688
Employed	32 (26.2)	26 (30.7)	6 (16.7)	0.011
Other	23 (18.9)	11 (12.8)	12 (33.3)	0.012
Level of education				
Primary	79 (64.8)	56 (65.1)	23 (63.9)	1.00
Secondary	37 (30.3)	26 (30.2)	11 (30.6)	1.00
Other	6 (4.9)	4 (4.7)	2 (3.6)	1.00
Clinic attendance				
> 5 years	40 (32.8)	20 (23.3)	20 (55.6)	0.001*
5–10 years	47 (38.5)	34 (39.5)	13 (36.1)	0.839
10+ years	35 (28.7)	32 (37.2)	3 (8.3)	0.001*

**p* < 0.05

tics of the sample population. Of the 122 patients providing data, 62% were females and 71% received nutritional counselling. The greatest number of patients [63%] was in the 51–70-year age group and of East Indian ethnicity [44%]. Most of the patients [39%] received a government pension and the majority [64%] only possessed a primary school education.

A summary of statistics for KAP scores by gender and receiving or not receiving counselling is shown in Table 2.

Table 2: Summary of statistics for KAP scores by gender and receiving or not receiving counselling

Score	Male	Female	<i>p</i>	Counselling	No counselling	<i>p</i>
Knowledge	5.80 ± 1.31	6.01 ± 0.72	0.326	6.07 ± 0.70	5.61 ± 1.42	0.072
Attitude	5.8 ± 1.89	5.36 ± 1.03	0.152	5.28 ± 0.85	6.11 ± 2.19	0.033*
Practice	10.70 ± 3.00	9.76 ± 2.68	0.087	11.16 ± 2.12	7.61 ± 2.76	< 0.001*

*Significance at the < 0.001 level (2-tailed). Scores are mean ± SD

Overall, the patients had adequate nutritional knowledge. There were no statistically significant differences in the means for knowledge, attitude or practice score based on gender [Table 2]. Analysis did not show any statistically significant differences in the total knowledge score for patients who received nutritional counselling in comparison to those without counselling. However, there was a statistically significant difference in attitude and practice score for patients who received counselling when compared to those who did not receive nutritional counselling [Table 2].

The general linear model used to examine the effect of gender, age group, level of education and nutrition counselling on knowledge, attitude and practice scores revealed a statistically significant interaction between the effects of gender and age group on knowledge score, $F = 2.631$, $p = 0.039$ (Figure).

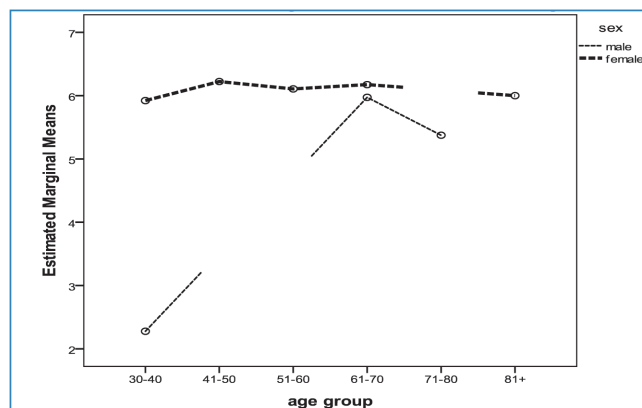


Figure: Gender and age group interaction of total knowledge score.

There were no significant interactions between the variables for attitude score or practice score; however, gender was independently significant for practice score, $F = 5.322$ and $p = 0.023$. Multiple regression analysis was used to develop pre-

diction equations for knowledge score using the following independent variables: gender, age group, level of education and nutrition counselling. The results indicate that only nutrition counselling statistically and significantly predicted knowledge score [$B = 0.444$, standard error = 0.192, $p = 0.023$].

Table 3 presents data summary of correct and positive responses for KAP questions between the two groups. In general, patients demonstrated excellent knowledge with respect to

what a person with diabetes should not eat or drink. However, they had a lack of knowledge about the correct serving size for fruit and cooked vegetables, as seen by less than 30% of the patients answering correctly [Table 3].

There were no statistically significant associations between both groups as it relates to the correct responses for the knowledge questions on serving sizes. In contrast, analysis showed statistically significant associations [$p = 0.003$, $p = 0.0043$ and $p = 0.041$] between groups for three knowledge questions, which asked the patient to identify the food item that a person with diabetes should not eat or drink.

The majority of patients had a positive attitude toward diabetes management, with responses above 90%. All patients [100%] believed that learning about nutrition was important for a person with diabetes. Additionally, 100% of the patients who received nutritional counselling responded positively to the statement “*diabetics should pay more attention to the foods they eat now that they have diabetes.*” There were no statistically significant associations observed for the attitude questions, which showed that there was no difference between the attitudes of the two groups.

The response of the patients to the practice questions is presented in Table 3. In general, patients did not practice good eating habits. Only 35% and 37% reported not drinking soft drinks or eating fast food, respectively. More than one-third [48%] indicated that they do not drink alcohol. The majority [71%] reported that they drink at least eight glasses of water daily. Data illustrated statistically significant associations between the two groups for three out of the four practice questions. Those who received counselling were less likely than those who did not receive counselling to consume soft drinks, fast foods and alcohol; however, both groups were equally likely to drink eight glasses of water on a daily basis.

Table 3: Data summary of correct and positive responses for KAP questions between groups

KAP questions	Frequency of correct and positive answers			p
	All participants [n (%)]	Participants who received counselling [n (%)]	Participants who received no counselling [n (%)]	
Knowledge of				
A serving of fruit	25 (20.5)	17 (19.8)	8 (22.2)	0.759
A serving of cereal	94 (77.0)	68 (79.1)	26 (72.2)	0.417
A serving of milk	119 (97.5)	85 (98.8)	34 (94.4)	0.153
A serving of pasta	105 (86.1)	77 (89.5)	28 (77.8)	0.087
A serving of cooked vegetables	31 (25.4)	21 (24.4)	10 (27.8)	0.698
What should a diabetic not eat/drink?	116 (95.1)	85 (98.8)	31 (86.1)	0.003*
What should a diabetic not eat/drink?	116 (95.1)	84 (97.7)	32 (88.9)	0.041*
What should a diabetic not eat/drink?	118 (96.7)	85 (98.8)	33 (91.7)	0.043*
Attitudes				
Dietitians need to tell diabetics about good eating/health	113 (92.6)	81 (94.2)	32 (88.9)	0.477
Eating habits affect your blood glucose	117 (95.9)	84 (97.6)	33 (91.7)	0.152
Diabetics should pay more attention to the foods they eat now that they have diabetes	121 (99.2)	86 (100.0)	35 (97.2)	0.295
Learning about nutrition is important for a diabetic	122 (100.0)	86 (100.0)	6 (100.0)	1.00
Nutrition counselling would better help diabetics to properly manage their diabetes	121 (99.2)	86 (100)	35 (97.2)	0.295
Practice				
Don't drink soft drinks	43 (35.3)	14 (16.3)	29 (80.6)	< 0.001*
Don't eat fast food	45 (36.9)	16 (18.6)	29 (80.6)	< 0.001*
Don't drink alcohol	59 (48.4)	34 (39.5)	25 (69.5)	0.003*
Don't drink at least 8 glasses of water daily	4 (3.3)	3 (2.8)	1 (2.8)	1.00

* $p < 0.05$

DISCUSSION

This study assessed KAP in relation to their disease among patients with Type 2 diabetes in one regional health district in Trinidad and Tobago and compared these attributes between patients receiving or not receiving nutrition counselling. Healthy eating is the cornerstone of any diabetes management plan; however, it is not just what an individual eats that affects blood sugar level, but also, how much and when one eats. Nutrition counselling therapy is an essential part in the treatment of diabetes and it is well recognized as a key part of the disease management in patients who have diabetes (13). Dietary adjustments are crucial in the management of diabetes. Persons living with diabetes very often need personal guidance, in order to increase their knowledge and thus, influence their choices of suitable foods and eating well-balanced meals (14, 15). Additionally, for effective disease prevention and treatment, behavioural changes are required.

Most patients with chronic diseases usually manage the illness at home (16). Our data revealed that the majority of patients prepare their meals or have their meals prepared by a family member. Hence, educating these individuals regarding proper portion control can improve their knowledge about diabetes management, which may assist with dietary adjustments. Malathy *et al* reported that educational status improved knowledge regarding the disease (17). In our study, most of the participants only had a primary school education. However,

this did not seem to have an impact on the nutrition knowledge scores. In contrast, Nilsen and colleagues found that where diabetics had a lower educational level, their mean diet score was 2.2 points lower [$p < 0.001$] than diabetics with a higher education level (18).

Several studies have reported that diabetes knowledge is poor among patients with the disease (19–23). These findings were not consistent with our results, which showed that the diabetic patients had adequate nutritional knowledge regarding diabetes. However, our results were consistent with a Malaysian study, which reported that participants had good KAP scores (24). The respondents had good nutrition knowledge for most questions except for the correct serving of fruit and cooked vegetables. Only 20% and 25% of the respondents answered correctly for a serving of fruit and cooked vegetables, respectively. The clients who never received nutrition counselling answered 70% of the knowledge questions correctly; those receiving counselling since they started attending clinic answered 76% of the knowledge questions correctly. Therefore, it can be deduced that the more the patients receive nutrition counselling, the more knowledgeable they become. Multiple regression confirmed that nutrition counselling was a good predictor of knowledge score [$p = 0.023$]. These results are consistent with a study conducted by Palaian *et al* who concluded that diabetic patient counselling improved the knowledge responses (25). It is important to note that the differences

in some findings in various studies may be related to the variations in the instruments used or the type of population.

The majority of the patients had a positive attitude toward diabetes management, as evident by the high attitude scores. Those who received nutrition counselling had a more positive attitude toward nutrition than those who did not receive counselling. Therefore, we can assume that counselling the patients about their disease can better equip them with the knowledge needed to adopt positive attitudes in disease management. Significant positive responses were observed for practice questions, although our results also showed that participants who did not receive counselling had a better overall practice score than those who did receive counselling. However, through counselling, participants know what foods to avoid; therefore, they may have under-reported what was actually consumed daily. Self-reported estimates of food intake are generally used for recommendation of macro- and micro-nutrients. However, it is well accepted that such methods do not necessarily provide accurate or unbiased estimations of an individual's food intake.

The present study has a number of strengths. First, to our knowledge, this is the only study which evaluated KAP of outpatients at a chronic disease clinic in Trinidad and Tobago. This is an important step in assisting with the research gap in this area. Second, this information can assist in the development of a more comprehensive study which can provide the country with data necessary to develop intervention programmes to manage diabetes and prevent complications.

Despite these strengths, the study also has a few limitations. Data were collected within the NCRHA. The clinics in question had the widest coverage; therefore, they were used as the sampled population. However, there was an inability to randomize the sample because only those patients who turned out for appointments at that time and sites were used, but there is no reason to believe that patients treated at those clinics are significantly different from those in other clinics with respect to the KAP variables measured. Additionally, the number of completed questionnaires was lower than desirable. Again, there is no reason to believe that non-participants differed significantly from participants with respect to KAP. We did not take into account counselling received from other sources, such as relatives, physicians, nurses, pharmacists and other patients which might have confounded the results. Additionally, we did not include any biochemical or clinical data, such as status of diabetes control in our analysis. Since biochemical or clinical data were not analysed in this sample, we could not actually draw any conclusion on dietary compliance. Further, our study was conducted at one regional health district; therefore, the results cannot be generalized to all persons with diabetes in Trinidad and Tobago.

In conclusion, this investigation provides valuable information regarding the level of KAP in diabetic management in outpatient clinics in Trinidad and Tobago. About 70% of patients with diabetes treated in public clinics in the NCRHA receive nutrition counselling as a regular part of their

treatment-management regimen; the other 30% receive no nutrition counselling. Patients receiving counselling are more knowledgeable about diabetes than those not receiving nutrition counselling; they also have a more positive outlook as to what it would take on the part of the patient and clinic care providers to manage the disease effectively. Steps should be taken to ensure that all patients with diabetes in this Regional Health Authority receive nutrition counselling as a regular part of clinic management of the disease.

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